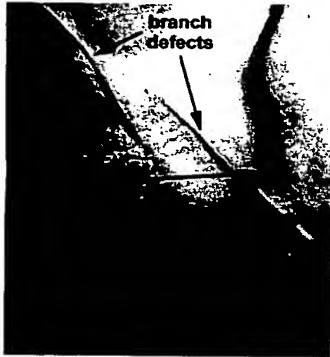


SERIES	I	I	II	II	II	III	III	III	III	IV
GROWTH TEMPERATURE	760°C	760°C	700°C	760°C	810°C	650°C	700°C	760°C	800°C	VARIABLE
PH <sub>3</sub> PRESSURE	800 pa	800 pa	2600 pa	800 pa	2600 pa	2600 pa	2600 pa	800 pa	800 pa	VARIABLE
INDIUM COMPOSITION (NOMINAL/MEASURED)	0.27/ 0.26	0.32/ 0.31	0.33/ 0.34	0.33/ 0.31	0.33/ 0.36	0.10/ 0.15	0.10/ 0.09	0.10/ 0.11	0.10/ 0.12	0.40/ 0.39
GRADING RATE	VARIABLE	VARIABLE	CONSTANT	CONSTANT	CONSTANT	CONSTANT	CONSTANT	CONSTANT	CONSTANT	CONSTANT

FIG. 1



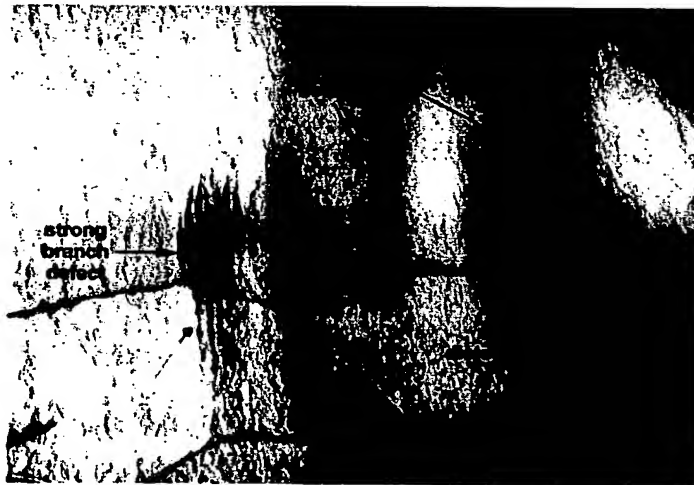
*FIG. 2*



*FIG. 4A*



*FIG. 4B*



*FIG. 5*

204040-240E200T

TEMPERATURE	760°C	760°C
$x$	0.26	0.31
$R_q - (10\mu\text{m})^2$ scan area	$25 \text{ nm} \pm 6 \text{ nm}$	$45 \text{ nm} \pm 25 \text{ nm}$
$\beta_{(004)}$	$170' \pm 8'$	$303' \pm 10'$
$\rho_{\text{field}} - \text{PVTEM}$	$6.3 \times 10^8 \text{ cm}^{-2}$ $\pm 2.4 \times 10^8 \text{ cm}^{-2}$	$1.1 \times 10^8 \text{ cm}^{-2}$ $\pm 0.2 \times 10^8 \text{ cm}^{-2}$
$\rho_{\text{pileup}} - \text{CL}$	$377 \text{ cm}^{-1}$	$1128 \text{ cm}^{-1}$
$\rho_{\text{linear}} - \text{PVTEM}$	$2.7 \times 10^4 \text{ cm}^{-1}$	$1.2 \times 10^5 \text{ cm}^{-1}$
$\rho_{\text{overall}} - \text{PVTEM} + \text{CL}$	$1.6 \times 10^7 \text{ cm}^{-2}$	$2.5 \times 10^8 \text{ cm}^{-2}$
$\rho_{\text{branch}} (\text{transverse}) - \text{PVTEM}$	$6000 \text{ cm}^{-1}$ $\pm 196 \text{ cm}^{-1}$	$4773 \text{ cm}^{-1}$ $\pm 693 \text{ cm}^{-1}$
$\rho_{\text{branch}} (\text{axial}) - \text{PVTEM}$	$939 \text{ cm}^{-1}$ $\pm 61 \text{ cm}^{-1}$	$832 \text{ cm}^{-1}$ $\pm 110 \text{ cm}^{-1}$

**FIG. 3**

4/13



*FIG. 6A*



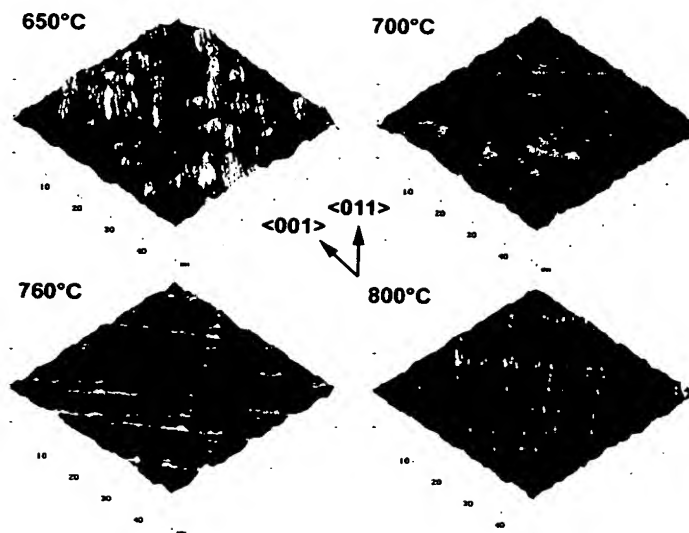
*FIG. 6B*



*FIG. 8A*



*FIG. 8B*



*FIG. 10*

10023047.040402

TEMPERATURE	700°C	760°C	810°C
$\chi$	0.34	0.31	0.36
$R_q - (10\mu\text{m})^2$	$13 \text{ nm} \pm 2 \text{ nm}$	$68 \text{ nm} \pm 25 \text{ nm}$	$118 \text{ nm} \pm 20 \text{ nm}$
$\beta_{(004)}$	$275' \pm 10'$	$420' \pm 30'$	—
$\rho_{\text{field}} - \text{CL}$	$4.9 \times 10^6 \text{ cm}^{-2}$ $\pm 0.9 \times 10^6 \text{ cm}^{-2}$	—	—
$\rho_{\text{field}} - \text{PVTEM}$	$4.4 \times 10^6 \text{ cm}^{-2}$ $\pm 1.0 \times 10^6 \text{ cm}^{-2}$	—	—
$\rho_{\text{pileup}} - \text{CL}$	$92 \text{ cm}^{-1} \pm 23 \text{ cm}^{-1}$	$> 2000 \text{ cm}^{-1}$	—
$\rho_{\text{linear}} - \text{CL} + \text{PVTEM}$	$2.1 \times 10^5 \text{ cm}^{-1}$	—	—
$\rho_{\text{overall}} - \text{CL} + \text{PVTEM}$	$6.8 \times 10^6 \text{ cm}^{-2}$ $\pm 2.0 \times 10^6 \text{ cm}^{-2}$	$1.5 \times 10^9 \text{ cm}^{-2}$ $\pm 0.3 \times 10^9 \text{ cm}^{-2}$	—
$\rho_{\text{branch}} (\text{transverse})$	$7970 \text{ cm}^{-1}$ $\pm 327 \text{ cm}^{-1}$	$5433 \text{ cm}^{-1}$ $\pm 529 \text{ cm}^{-1}$	—

FIG. 7

TEMPERATURE	650°C	700°C	760°C	800°C
x	0.15	0.09	0.11	0.12
$R_q - (10\mu\text{m})^2$ scan	8.5 nm $\pm$ 1.5 nm	7.7 nm $\pm$ 1 nm	6.0 nm $\pm$ 0.5 nm	4.9 nm $\pm$ 0.5 nm
$R_q - (50\mu\text{m})^2$ scan	12.2 nm $\pm$ 1.5 nm	10.5 nm $\pm$ 1 nm	7.4 nm $\pm$ 0.5 nm	6.0 nm $\pm$ 0.5 nm
$\beta_{(004)}$	93' $\pm$ 5'	58' $\pm$ 3'	54' $\pm$ 3'	53' $\pm$ 3'
$\rho_{\text{field}} - \text{PVTEM}$	1.2 x 10 <sup>7</sup> cm <sup>-2</sup> $\pm$ 0.3 x 10 <sup>7</sup> cm <sup>-2</sup>	3.9 x 10 <sup>6</sup> cm <sup>-2</sup> $\pm$ 1.4 x 10 <sup>6</sup> cm <sup>-2</sup>	1.1 x 10 <sup>6</sup> cm <sup>-2</sup> $\pm$ 0.6 x 10 <sup>6</sup> cm <sup>-2</sup>	4.0 x 10 <sup>5</sup> cm <sup>-2</sup> $\pm$ 1.9 x 10 <sup>5</sup> cm <sup>-2</sup>
$\rho_{\text{branch}} (\text{transverse}) - \text{PVTEM}$	26911 cm <sup>-1</sup> $\pm$ 2265 cm <sup>-1</sup>	9808 cm <sup>-1</sup> $\pm$ 654 cm <sup>-1</sup>	—	—
$\rho_{\text{branch}} (\text{transverse}) - \text{AFM}$	24114 cm <sup>-1</sup> $\pm$ 7312 cm <sup>-1</sup>	—	—	—
Crosshatch Wavelength <011>-A	—	—	3.4 $\mu\text{m}$ $\pm$ 0.9 $\mu\text{m}$ , 8.7 $\mu\text{m}$ $\pm$ 0.5 $\mu\text{m}$	3.0 $\mu\text{m}$ $\pm$ 0.3 $\mu\text{m}$ , 7.0 $\mu\text{m}$ $\pm$ 1.1 $\mu\text{m}$
Crosshatch Amplitude <011>-A	—	—	9.9 nm $\pm$ 1.5 nm, 14.7 nm $\pm$ 2.4 nm	7.9 nm $\pm$ 1.2 nm, 11.7 nm $\pm$ 1.3 nm
Crosshatch Wavelength <011>-B	—	—	4.6 $\mu\text{m}$ $\pm$ 0.7 $\mu\text{m}$ 8.5 $\mu\text{m}$ $\pm$ 1.3 $\mu\text{m}$	3.0 $\mu\text{m}$ $\pm$ 0.4 $\mu\text{m}$ , 6.3 $\mu\text{m}$ $\pm$ 1.5 $\mu\text{m}$
Crosshatch Amplitude <011>-B	—	—	10.5 nm $\pm$ 2.9 nm, 17.4 nm $\pm$ 2.7 nm	8.6 nm $\pm$ 1.2 nm, 12.4 nm $\pm$ 1.7 nm

FIG. 9



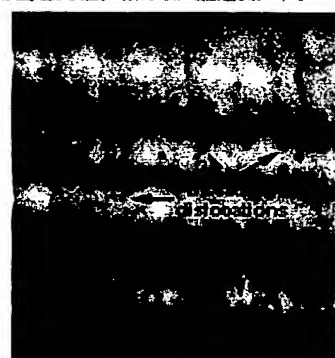
*FIG. 11A*



*FIG. 11B*



*FIG. 13A*



*FIG. 13B*

10023047 .040402

TEMPERATURE	760°C / 700°C / 650°C
x	0.389
$R_q - (10 \mu\text{m})^2 \text{ scan}$	$13 \text{ nm} \pm 4 \text{ nm}$
$\beta_{(004)}$	$277' \pm 10'$
$\rho_{\text{field}} - \text{CL}$	$4.1 \times 10^6 \text{ cm}^{-2}$ $\pm 0.5 \times 10^6 \text{ cm}^{-2}$
$\rho_{\text{field}} - \text{PVTEM}$	$3.7 \times 10^6 \text{ cm}^{-2}$ $\pm 0.8 \times 10^6 \text{ cm}^{-2}$
$\rho_{\text{pileup}} - \text{CL}$	$71 \text{ cm}^{-1} \pm 18 \text{ cm}^{-1}$
$\rho_{\text{linear}} - \text{CL} + \text{PVTEM}$	$8.5 \times 10^3 \text{ cm}^{-1}$
$\rho_{\text{overall}} - \text{CL} + \text{PVTEM}$	$4.7 \times 10^6 \text{ cm}^{-2}$ $\pm 1.1 \times 10^6 \text{ cm}^{-2}$
$\rho_{\text{branch}} (\text{transverse}) - \text{PVTEM}$	$24636 \text{ cm}^{-1}$ $\pm 821 \text{ cm}^{-1}$
$\rho_{\text{branch}} (\text{transverse}) - \text{AFM}$	$24000 \text{ cm}^{-1}$ $\pm \text{XXX cm}^{-1}$

**FIG. 12**



9/13

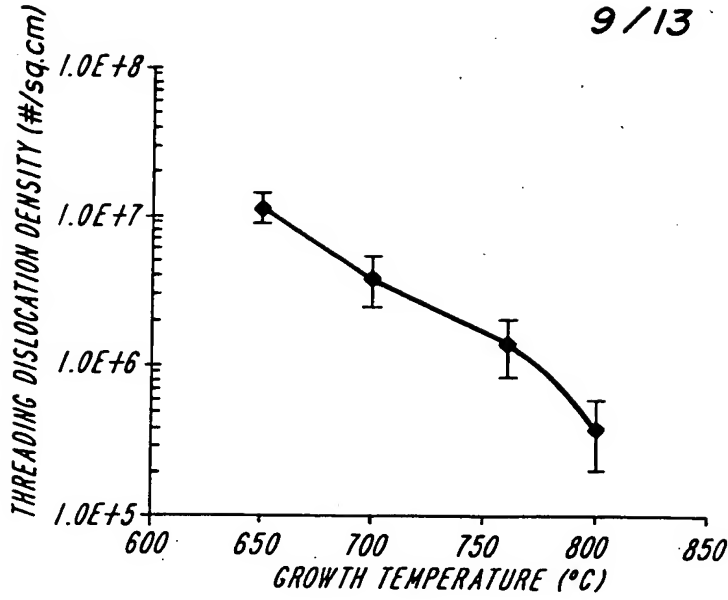


FIG. 14

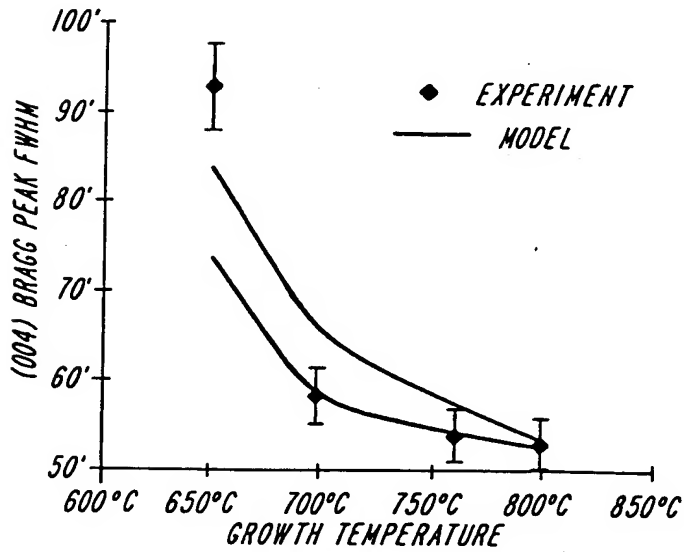


FIG. 15

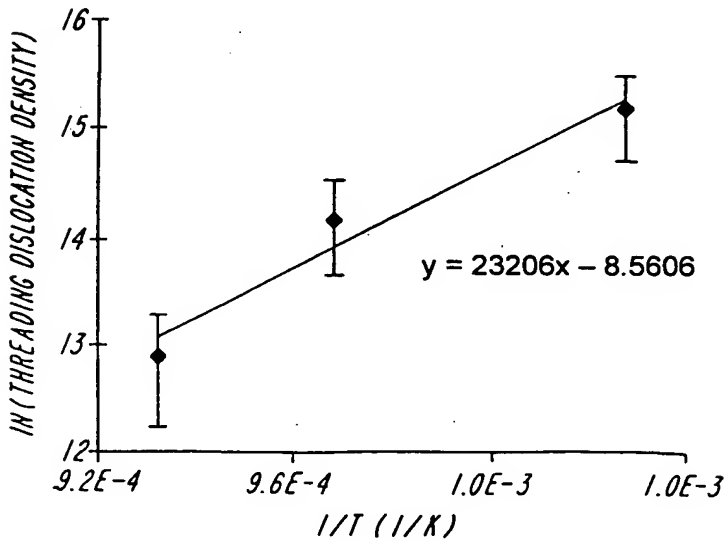


FIG. 16

10023047.040402

204040" 240E200T  
10023047.040402

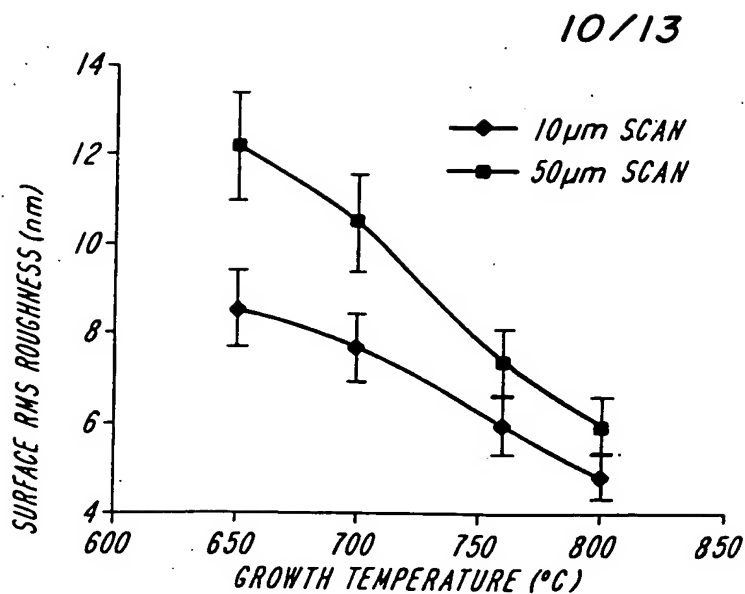


FIG. 17

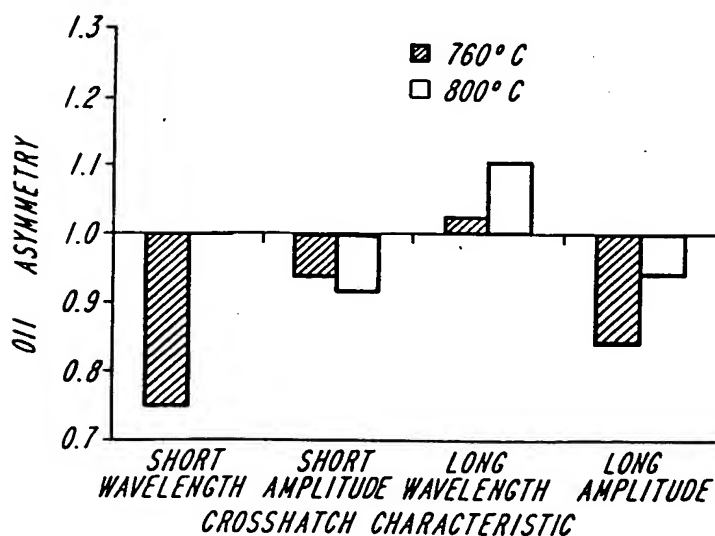


FIG. 18

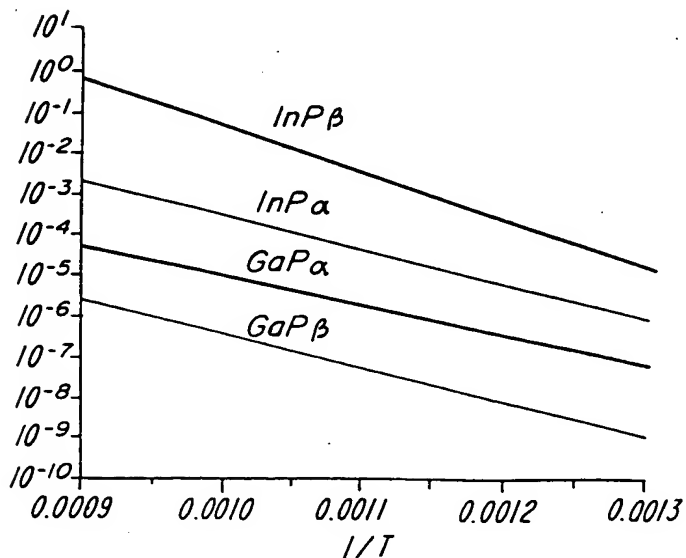
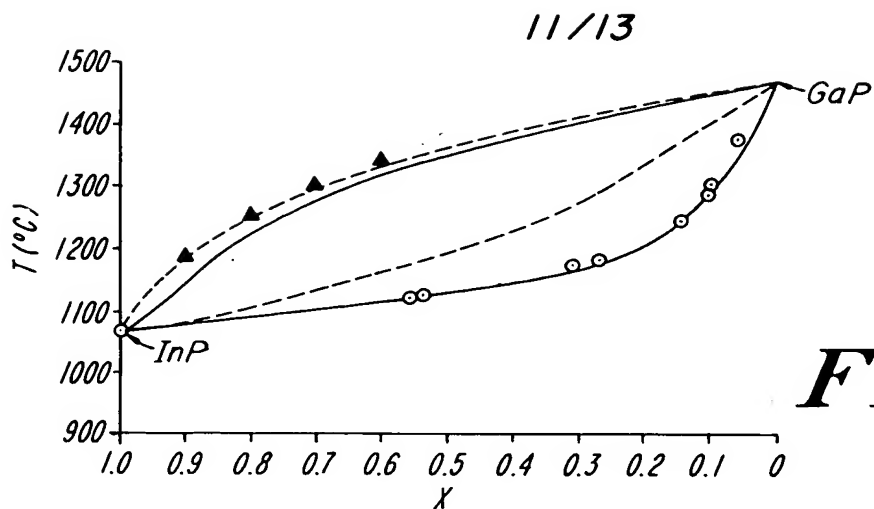
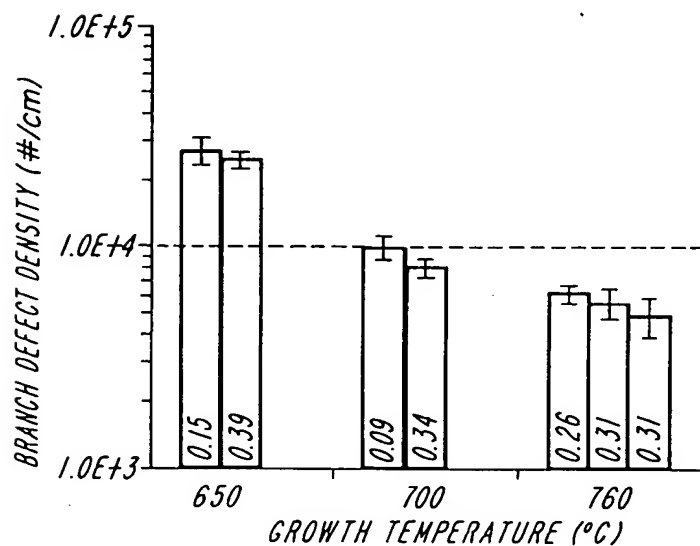


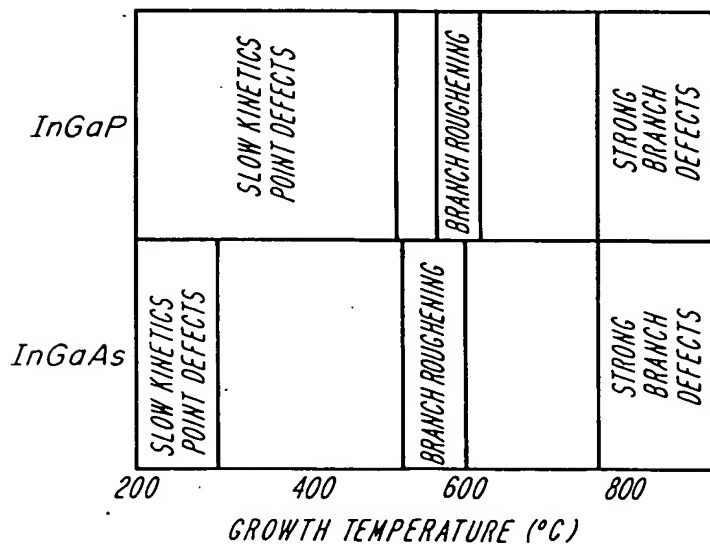
FIG. 19



**FIG. 20**

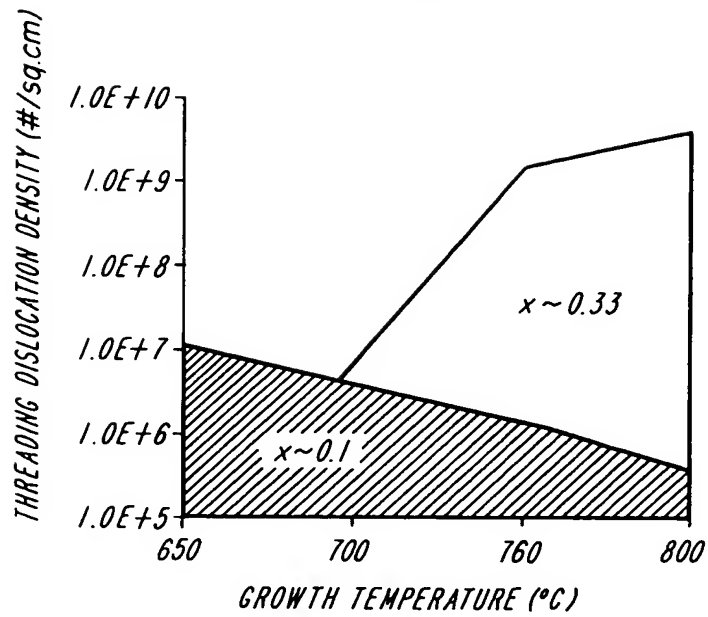


**FIG. 21**

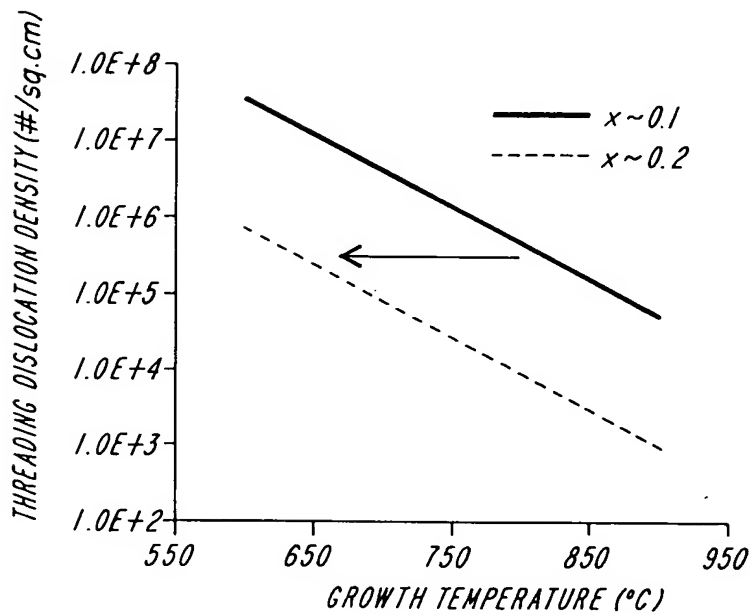


**FIG. 22**

12/13



**FIG. 23**



**FIG. 24**

